IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Lynn P. Nelles	)
		) Group Art Unit: 1761
SERIAL NO.:	09/993,048	)
		)
FILED:	11/13/2001	) Before the Examiner:
		) Leslie A. Wong
FOR:	TREATMENT OF VEGETABLE OILS OR ANIMAL FATS WITH SULFUR OR NITROGEN DONOR COMPOUNDS FOR ANIMAL FOOD FLAVORINGS	)

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Assistant Commissioner for Patents
P.O. Box 1450
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DECLARATION UNDER 37 CFR 1.132

Dr. Deborah Roberts declares and says that:

1. I am familiar with the subject matter of above-referenced U.S. patent application serial number 10/178,909, specifically palatability enhancers for animal foods including reaction products.

2. I graduated from Cornell University with a Ph.D. Degree in Food Science in January 1996. From 1996 to 2002, I have been employed as a research flavor chemist for Nestle S.A. From 2003 until 2005, I have been employed as a consultant to the food and flavor industries for Food and Flavor Science Consulting LLC. I have greater than 9 years experience as a flavor chemist.

3. **How/Why does the flavor perception differ in pets and humans?**
Flavor is composed of two senses, taste and odor. The receptors for taste are on the tongue and the receptors for odor are in the nose. The receptors for dogs and cats have been characterized by a number of studies. The following tables summarize the differences in the olfaction and taste between species. On the physiological level, there are marked differences in the "hardware" that cats, dogs, and humans come equipped with. These also translate into differences in liking for various components of a flavor (Table 2).

Table 1. Key physiological and genetic differences between humans, cats, and dogs in smell.

	Humans	**Cats**	**Dogs**
Size of olfactory epithelium area (in sq. cm)	3-4	21	18-150, depending on breed
Number of odor receptors	5 million	67 million	220 million
% pseudogenes (non-functional) in olfactory subgenome	60%	Data not available	12%
Number of functional olfactory receptor genes	X	Data not available	3X

Table 2. Key physiological, response, and genetic differences between humans, cats, and dogs in taste.

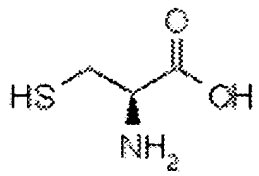
	Humans	**Cats**	**Dogs**
Number of taste receptors	9000	1700	473
Sensitivity to salt	High	Low	Low, may be flavor enhancer
Sensitivity to bitter	High	Medium, reject quinine	Reject quinine solution
Furaneol taste receptor	No	No	yes
Sensitivity to sweetness	High, like sweetness	No	High, like sweetness
Taurine taste receptor	No	Yes	No
X-units responding to quinine and various acids	Have acid receptors	Yes, likes acidity	Likes some acidity
Amino acid response	Some are sweet or bitter	Likes lysine, histidine, alanine, proline. Dislikes tryptophan, isoleucine, and adenine	
Fatty acid response	Like high fat foods	Aversion to capyrlic acid and MCT	Like high fat foods

4. How do flavors differ between pets and humans?

Due to the different odor and taste physiology of pets and humans, the flavor compounds in their flavorings are perceived differently in different species. As the dog is much more sensitive to odorant compounds that humans, they have lower thresholds for many compounds and are able to smell compounds at levels that have no odor for humans. As we know by our interactions with our dogs, they also prefer different odors to humans. A dog will happily roll in a dead bird or feces from another animal because they like those scents that human obviously do not. Thus, flavorings for dogs must contain more of these types of compounds, which are typically sulfur-containing compounds. Cats have a different set of flavor "hardware" so flavorings designed for cats are indeed different from dogs and different from humans. Cats lack the receptor mechanism for sweet taste, have an aversion to certain fats, and respond to certain amino acids that humans do not. A flavorant that is liked by one species is not necessarily liked by another species. Each must be developed and tested separately.

5. Is cysteine itself different from a reaction of cysteine? How?

Cysteine is a sulfur-containing amino acid:

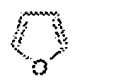


CYSTEINE

L-Cysteine is a non-essential (or semi-essential), neutral, genetically coded amino acid.
Molecular formula
$C_3H_7NO_2S$
Molecular weight
121.15

Cysteine is used as a starting material for reaction flavors. During reaction such as a one Maillard reaction, many odorous volatile compounds are formed that are very different chemically from cysteine. In one example, 47 volatile compounds identified from a reaction with cysteine were 15 aldehydes, 8 alcohols, 7 furans, 6 hydrocarbons, 5 ketones, 3 sulfur-containing compounds, 2 nitrogen-containing compounds and an acid[1]. The compounds formed in a reaction between ribose and cysteine are shown below[2].

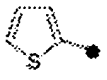
[1]Jang, H-J. et al. IFT annual meeting 2004, abstract 114B-22
[2] Cerny, C. and Davidek, T. J. Agric. Food Chem. 2004, 52 (958-961)


(1)


(2)


(3a; 65%)


(3b; 35%)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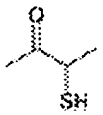
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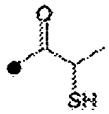
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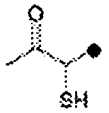
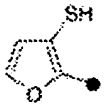

(5c; 20%)


(6)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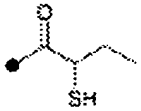
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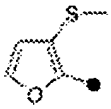
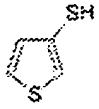
(9)


(10a; 13%)


(10b; 87%)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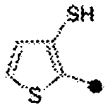
(12)

As you can see, the compounds formed from a reaction between cysteine and ribose are different from the base cysteine molecule above. These compounds also have low odor thresholds so the sensory profile of the reaction flavor is much more meaty than cysteine and ribose by themselves. Thus, a reaction flavor that uses cysteine is different chemically and sensorially from the starting materials. Similar chemistry also applies for other sulfur containing amino acids that are reacted with a sugar (i.e. ribose, glucose, etc) in that numerous and different chemicals are produced that are different from the starting molecules. Similarly, a variety of products would be produced when cysteine is reacted with a fat.

6. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the patent.

Date: Aug. 17, 2005 Deborah Roberts

Dr. Deborah Roberts